

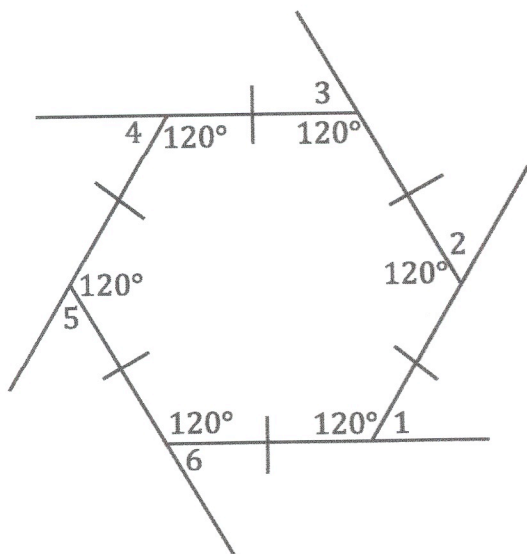
Exterior Angles of Polygons

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Poly went outside of course. She is, after all, a parrot.

Related to the interior angles of polygons, we also have the exterior angles of polygons. What are these? Well, remember the remote exterior angle theorem from triangles? It's kinda like that. What do you think the sum of the exterior angles of any polygon is? Let's take a look....

Remember that one interior angle of a regular hexagon is 120° ?



To find an exterior angle of the hexagon, all we have to do is realize that $m\angle 1$ and 120° are supplementary, right? So, that makes $m\angle 1 + 120 = 180$. A little algebra and $m\angle 1 = 60^\circ$. $m\angle 1 = m\angle 2 = m\angle 3 = m\angle 4 = m\angle 5 = m\angle 6$, because you would do the same calculation to get each angle. Because the polygon is regular $6 \cdot 60 = 360$. It just so happens that if you were to repeat this with any polygon, regular or not, you would get 360° . So....

The sum of the exterior angles of any polygon is 360° .

Also... one angle of a regular n-gon = $\frac{360^\circ}{n}$

Let's look at some examples...

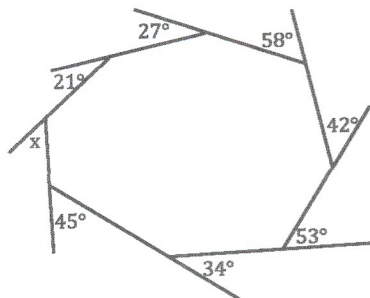
Ex. 1. What is the measure of an exterior angle of a regular Octagon?

$$n=8 \quad \frac{360^\circ}{n} \quad \frac{360^\circ}{8} = 45^\circ$$

Ex. 2. How many sides does a regular polygon have if one of its exterior angles = 18° ?

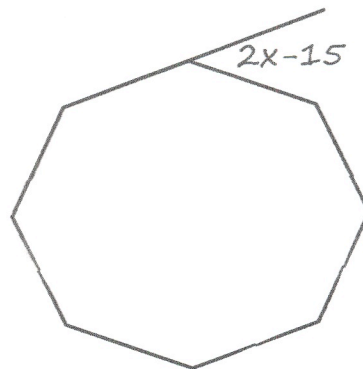
$$\frac{360^\circ}{n} = 18^\circ \quad n * \frac{360^\circ}{n} = 18^\circ * n \quad 360^\circ = 18^\circ n \quad \frac{360^\circ}{18^\circ} = \frac{18^\circ n}{18^\circ} \quad 20 = n \text{ so... } 20 \text{ sides}$$

Ex. 3. Find the missing angle.



$$\begin{aligned} 21^\circ + 27^\circ + 58^\circ + 42^\circ + 53^\circ + 34^\circ + x &= 360^\circ \\ 280^\circ + x &= 360^\circ \\ -280^\circ \quad -280^\circ & \\ x &= 80^\circ \end{aligned}$$

Ex. 4. Solve for x.



$$\begin{aligned} n &= 8 \\ \frac{360^\circ}{n} & \\ \frac{360^\circ}{8} & \\ 45^\circ & \end{aligned}$$

$$\begin{aligned} 2x - 15^\circ &= 45^\circ \\ +15^\circ \quad +15^\circ & \\ \frac{2x}{2} &= \frac{60^\circ}{2} \\ x &= 30^\circ \end{aligned}$$

Answer each question...

1. What is the measure of an exterior angle of a regular Pentagon?
2. What is the measure of an exterior angle of a regular Hexagon?
3. What is the measure of an exterior angle of a regular Decagon?
4. What is the measure of an exterior angle of a regular Heptagon?
5. What is the measure of an exterior angle of a regular Nonagon?
6. What is the measure of an exterior angle of a regular 11-gon?
7. What is the measure of an exterior angle of a regular 15-gon?
8. What is the measure of an exterior angle of a regular Dodecagon?

Bubble all the correct answers from above. Don't bubble incorrect answers.

☐ 32 ☐ 31.54 ☐ 20 ☐ 68.43 ☐ 36 ☐ 32.73 ☐ 72 ☐ 60 ☐ 30 ☐ 50 ☐ 34 ☐ 24 ☐ 51.43 ☐ 40

9. How many sides does a regular polygon have if one of its exterior angles $=15^\circ$?
10. How many sides does a regular polygon have if one of its exterior angles $=36^\circ$?
11. How many sides does a regular polygon have if one of its exterior angles $=20^\circ$?
12. How many sides does a regular polygon have if one of its exterior angles $=9^\circ$?
13. How many sides does a regular polygon have if one of its exterior angles $=45^\circ$?
14. How many sides does a regular polygon have if one of its exterior angles $=60^\circ$?
15. How many sides does a regular polygon have if one of its exterior angles $=11.25^\circ$?
16. How many sides does a regular polygon have if one of its exterior angles $=30^\circ$?

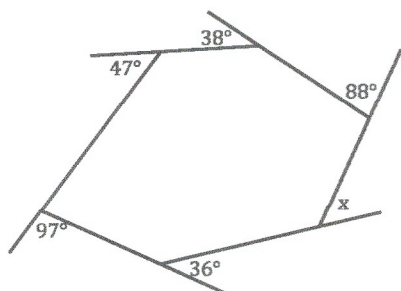
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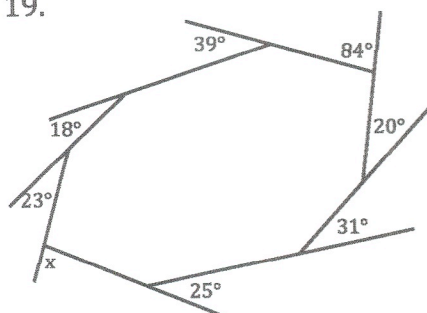
☐ 24 ☐ 32 ☐ 12 ☐ 15 ☐ 40 ☐ 10 ☐ 50 ☐ 26 ☐ 10 ☐ 65 ☐ 8 ☐ 6 ☐ 17 ☐ 9

Find the missing angle.

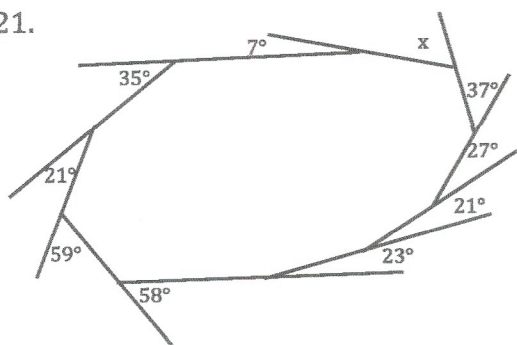
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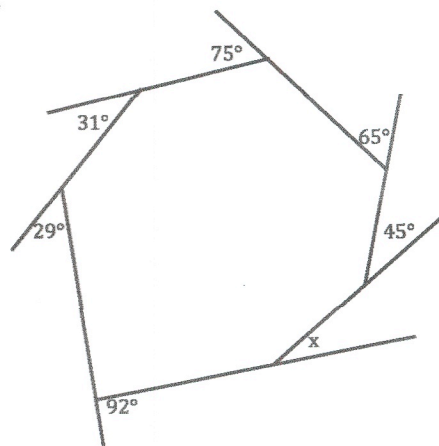
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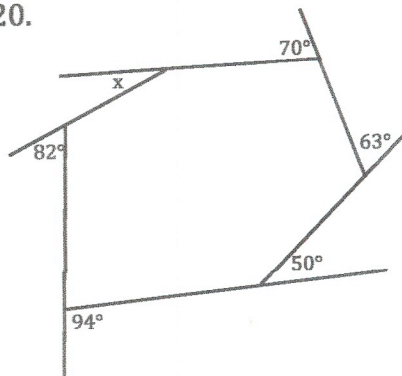
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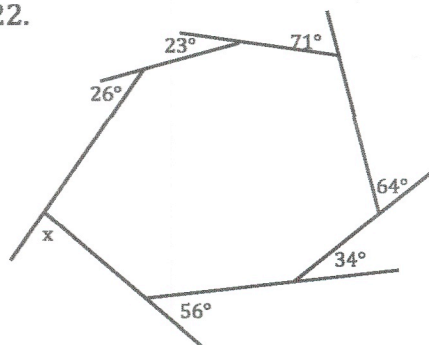
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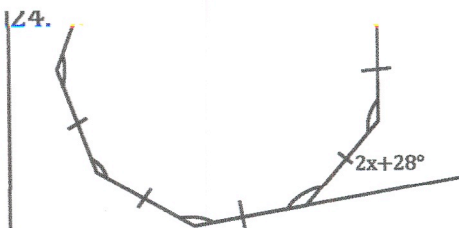
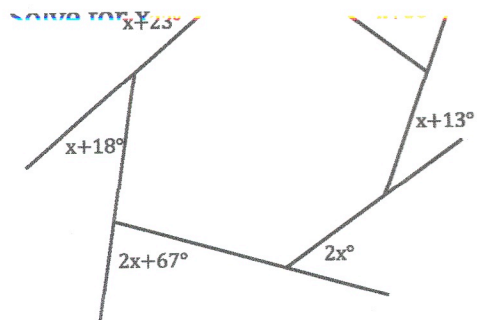


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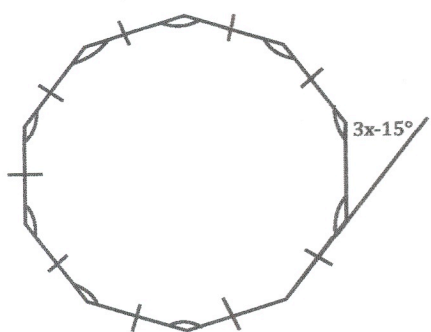


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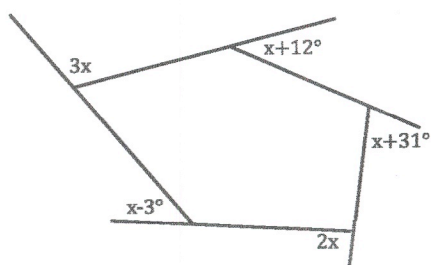
- ☐ 86
 ☐ 89
 ☐ 72
 ☐ 2
 ☐ 1
 ☐ 125
 ☐ 120
 ☐ 26
 ☐ 23
 ☐ 54



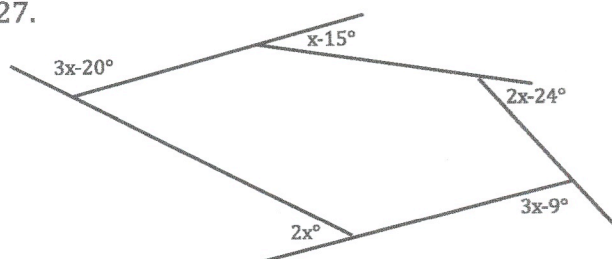
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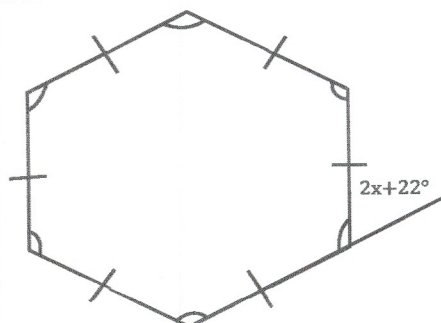
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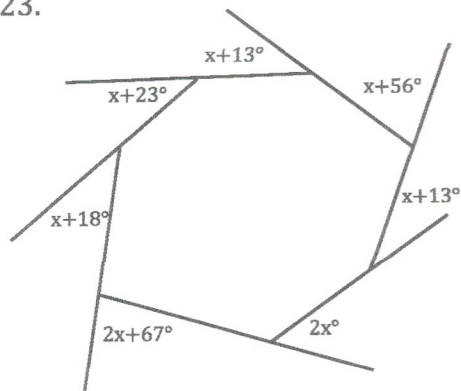


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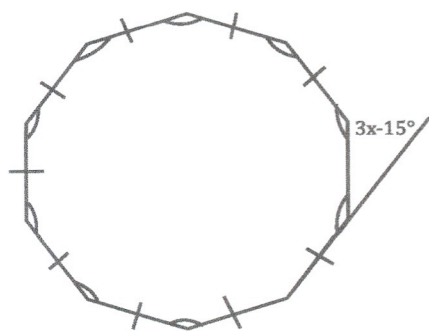
- ☐ 9
 ☐ 38.91
 ☐ 6
 ☐ 23.85
 ☐ 19
 ☐ 17.77
 ☐ 18.88
 ☐ 17
 ☐ 40
 ☐ 30

Solve for x.

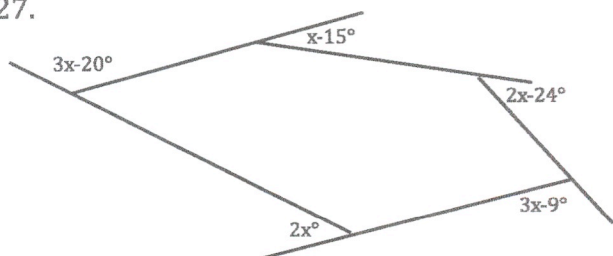
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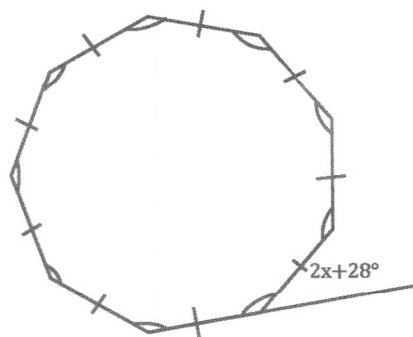
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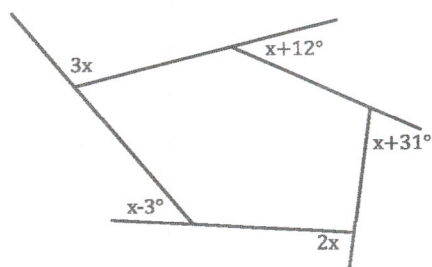
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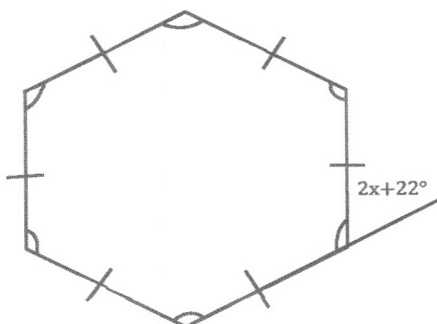
24.



26.



28.



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☐ 9 ☐ 38.91 ☐ 6 ☐ 23.85 ☐ 19 ☐ 17.77 ☐ 18.88 ☐ 17 ☐ 40 ☐ 30